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EXAMINER	
CAMPOS, YAIMA	

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Please find below and/or attached an Office communication concerning this application or proceeding.

The time period for reply, if any, is set in the attached communication.

PTOL-90A (Rev. 04/07)

Office Action Summary	Application No.	Applicant(s)	
	10/606,699	MEIRI ET AL.	
	Examiner	Art Unit	
	Yaima Campos	2185	

-- The MAILING DATE of this communication appears on the cover sheet with the correspondence address --

Period for Reply

A SHORTENED STATUTORY PERIOD FOR REPLY IS SET TO EXPIRE 3 MONTH(S) OR THIRTY (30) DAYS, WHICHEVER IS LONGER, FROM THE MAILING DATE OF THIS COMMUNICATION.

- Extensions of time may be available under the provisions of 37 CFR 1.136(a). In no event, however, may a reply be timely filed after SIX (6) MONTHS from the mailing date of this communication.
- If NO period for reply is specified above, the maximum statutory period will apply and will expire SIX (6) MONTHS from the mailing date of this communication.
- Failure to reply within the set or extended period for reply will, by statute, cause the application to become ABANDONED (35 U.S.C. § 133). Any reply received by the Office later than three months after the mailing date of this communication, even if timely filed, may reduce any earned patent term adjustment. See 37 CFR 1.704(b).

Status

1)☒ Responsive to communication(s) filed on 07 May 2007.

2a)☒ This action is **FINAL**. 2b)☐ This action is non-final.

3)☐ Since this application is in condition for allowance except for formal matters, prosecution as to the merits is closed in accordance with the practice under *Ex parte Quayle*, 1935 C.D. 11, 453 O.G. 213.

Disposition of Claims

4)☒ Claim(s) 1-18 is/are pending in the application.

4a) Of the above claim(s) _____ is/are withdrawn from consideration.

5)☐ Claim(s) _____ is/are allowed.

6)☒ Claim(s) 1-18 is/are rejected.

7)☐ Claim(s) _____ is/are objected to.

8)☐ Claim(s) _____ are subject to restriction and/or election requirement.

Application Papers

9)☐ The specification is objected to by the Examiner.

10)☐ The drawing(s) filed on _____ is/are: a)☐ accepted or b)☐ objected to by the Examiner.

Applicant may not request that any objection to the drawing(s) be held in abeyance. See 37 CFR 1.85(a).

Replacement drawing sheet(s) including the correction is required if the drawing(s) is objected to. See 37 CFR 1.121(d).

11)☐ The oath or declaration is objected to by the Examiner. Note the attached Office Action or form PTO-152.

Priority under 35 U.S.C. § 119

12)☐ Acknowledgment is made of a claim for foreign priority under 35 U.S.C. § 119(a)-(d) or (f).

a)☐ All b)☐ Some * c)☐ None of:

1.☐ Certified copies of the priority documents have been received.

2.☐ Certified copies of the priority documents have been received in Application No. _____.

3.☐ Copies of the certified copies of the priority documents have been received in this National Stage application from the International Bureau (PCT Rule 17.2(a)).

* See the attached detailed Office action for a list of the certified copies not received.

Attachment(s)

1) ☒ Notice of References Cited (PTO-892)
2) ☐ Notice of Draftsperson's Patent Drawing Review (PTO-948)
3) ☐ Information Disclosure Statement(s) (PTO/SB/08) Paper No(s)/Mail Date _____.
4) ☐ Interview Summary (PTO-413) Paper No(s)/Mail Date. _____ .
5) ☐ Notice of Informal Patent Application
6) ☐ Other: _____.

1. The examiner acknowledges the applicant's submission of the amendment dated May 7, 2005. At this point claims 1 and 10 have been amended, and no claims have been cancelled. Thus, claims 1-18 are pending in the instant application.

REJECTIONS BASED ON PRIOR ART

Claim Rejections - 35 USC § 103

2. The following is a quotation of 35 U.S.C. 103(a) which forms the basis for all obviousness rejections set forth in this Office action:

> (a) A patent may not be obtained though the invention is not identically disclosed or described as set forth in section 102 of this title, if the differences between the subject matter sought to be patented and the prior art are such that the subject matter as a whole would have been obvious at the time the invention was made to a person having ordinary skill in the art to which said subject matter pertains. Patentability shall not be negatived by the manner in which the invention was made.

3. **Claims 1, 6, 10 and 15** are rejected under 35 U.S.C. 103(a) as being unpatentable over Ofek (US 5,901,327) in view of VanHuben et al. (US 6,038,651) and Cha et al. (US 2002/0116404).

4. As per **claims 1 and 10**, Ofek discloses "A method/(computer software) of using a local storage device to read desired data while the data is **transferred from the local storage device to** a remote storage device using the cache of the local storage device in connection with transferring chunks of data from the local storage device to the remote storage device, the method comprising:" [**With respect to this limitation, Ofek discloses "a system and method for automatically providing and maintaining a copy or mirror of data stored at a location remote from the main or primary data storage device" (Column 1, lines 15-19) wherein "data is retrieved from a remote device through the host data processing system" (Column 4, lines 55-56) and further**

explains that "the host 12 writes data to and reads data from the primary data storage system 14" (column 4, lines 62-63). Ofek also teaches; "The host central processing unit 212 can also be provided with optional host remote mirroring (RM) software 213 so that the data processing system can be configured and monitored from a user interface of the host central processing unit. Host application programs can also interface with the remote mirroring facility of the data storage systems 214, 246 via the optional host remote mirroring (RM) software 213" (Column 10, lines 2-9). Ofek further discloses having a semi-synchronous mode in which "when the data storage system containing the primary (R1) volume has valid data in cache destined for a secondary (R2) volume, a link adapter transfers data via an available link path to the cache in the data storage system containing the secondary (R2) volume. This data transfer occurs while the data storage system containing the primary (R1) volume continues to perform additional channel commands" (Column 13, lines 28-67) wherein these channels commands are satisfied from cache in the local device if the data is in cache (Column 14, lines 1-65)]

"if the desired data is entirely in the cache of the local storage device, the local storage device returning the data from the cache;" **[With respect to this limitation, Ofek discloses that during a read access, "the channel adapter accesses the cache. If the data requested by the host is not in the cache, then the data is fetched by a disk adapter from disk storage in the data storage system, and loaded into the cache" (Column 14, lines 28-31)]**

<u>wherein the cache of the local storage device contains data written to the local storage device begun after a first time and before a second time that is associated</u>

with a first chunk of data and contains data written to the local storage device begun after the second time that is associated with a second chunk of data different from the first chunk of data and wherein after completion of all writes associated with the first chunk of data, the local storage device initiates transfer of writes associate with the first chunk of data to the remote storage device, [Ofek discloses "the host processor sends chains of channel commands to the data storage system containing a primary (R1) volume of a remotely mirrored volume pair. The results of all channel commands of each chain, for example, are to be committed before commitment of the results of any following channel commands. The data storage system containing the primary (R1) volume bundles the write data for all write commands in the chain into a single write command for transmission over the data link to the secondary data storage system containing the secondary (R2) volume... once the last channel command in the chain is received, it transmits the bundle of write data for the chain over the link to the data storage system containing the secondary volume" (Page 2, lines 37-53) wherein these channels commands are satisfied from cache in the local device (Column 14, lines 28-34)] wherein "when the data storage system containing the primary (R1) volume has valid data in cache destined for a secondary (R2) volume, a link adapter transfers data via an available link path to the cache in the data storage system containing the secondary (R2) volume. This data transfer occurs while the data storage system containing the primary (R1) volume continues to perform additional channel commands" (Page 13, lines 36-42). Ofek further explains "the link adapter removes the entry from the head of the link queue, marks the status information of the header with a time

stamp or sequence number, and executes the job to send the command... the time stamp or sequence number can be used by the remote data storage system to detect link transmission problems and to write to its cache in proper sequence data from commands received from various links and link adapters despite the possible delay of some commands due to link failure" (Page 38, lines 34-57); therefore, the data transmitted from a host to a primary system might not necessary be transmitted to a secondary/remote system in the same order it was written to the host system, as some of the data written to the host system might not be written in proper sequence to the secondary/remote system due to delays of some commands due to link failure] and if the desired data is not entirely in a cache of the local storage device, reading data from the remote storage device to the local storage device and the local storage device merging the data from the remote storage device with data from the cache of the local storage device at the local storage device **[Ofek teaches that if data is not available in a local/primary volume, "a request for data access to a primary (R1) volume can be satisfied by obtaining the requested data from the secondary volume (R2) in the remote data storage system" (Column 14, lines 43-48); therefore, when data is not available in the cache of the local device, it is loaded from the remote storage device to the cache of the local storage device. Ofek also discloses "in the automatic mode, if the data is not available in cache during a read operation, then the data storage system reads the data from the primary (R1) volume. If a data check occurs on this device, the data storage system automatically reads the data from the secondary volume" (Column 24, lines 48-67) wherein "another background task running on the data storage system such as in the service processor or storage system controller**

constantly checks invalid track bits on each data storage device, and if a bit is found to be set, the copy task is invoked to copy from the known good device to the device with the invalid track set" (Column 8, line 58 – Column 9, line 12). Therefore, in the automatic mode, when the cache has invalid tracks, data is loaded/merged from a secondary volume having valid tracks, as specified in the claims].

Ofek does not disclose expressly the details of "**<u>an order of the transfer being independent of an order in which data writes of the first chunk are provided to the local storage device.</u>**"

To further detail Ofek, VanHuben discloses merging the data from the remote storage device with data from the cache of the local storage device at the local storage device as **["a high speed remote storage cluster interface controller" (Col. 1, lines 9-10) "the main memory banks are physically distributed between the two clusters of the bi-nodal system" (Col. 4, lines 47-64) wherein "a 64 byte I/O Store which requires the incoming 64 bytes to be merged with the most recent copy of the same line of data prior to being stored into main memory... if the data targets the local memory, but hits in the remote cache, then the line needs to be retrieved from the remote side in order for the merge to take place on the local cluster. This necessitates a cross interrogate to the remote side along with a possible data fetch" (Col. 6, lines 4-26; Col. 13, line 36-Col. 14, line 7)].**

Cha discloses "**<u>an order of the transfer being independent of an order in which data writes of the first chunk are provided to the local storage device</u>**" as **["logging, the process of recording updates in terms of log records in a log file... the process called checkpointing is often used where the database is copied to a disk in a**

regular interval so that only the log records since the last checkpointing need to be stored" (Pars. 0005-0006) "a main-memory database management system (DBMS), where two backups (101 and 102) are maintained with a log (103). A single checkpointing process updates only one of the backups, and successive checkpointing processes alternate between them" (Par. 0007) "the conventional logging method imposes the sequential ordering because the undo and redo operations are not cumulative and assoociative" (Par. 0011) and explains that "the differential logging of the scheme of the present invention enables an accurate reconstruction regardless of the order of applying the log records... This differential logging scheme may be applied to both a main-memory DBMS where the database is primarily stored in main memory and a disk-resident DBMS" (Par. 0041) "FIGS. 10a and 10b is a flow charts of a modified two-pass process used in the present invention to recover the database from a backup made by the fuzzy checkpointing process" (Par. 0049)].

Ofek (US 5,901,327), VanHuben et al. (US 6,038,651) and Cha et al. (US 2002/0116404) are analogous art because they are from the same field of endeavor of computer memory access and control.

At the time of the invention it would have been obvious to a person of ordinary skill in the art to modify the backup and retrieval of data as taught by Ofek and further merging the data for the parts of the particular track from the remote storage device with data from the cache of the local storage device at the local storage device to interleave the parts of the particular track from the remote storage device with the different parts of the particular track from the local storage device as taught by VanHuben.

The motivation for doing so would have been because VanHuben discloses merging data from a remote storage device with data in a local storage device is done to **["manage the interface data paths more efficiently by eliminating unnecessary data transfers" (Col. 6, lines 5-6; Col. 13, lines 36-37) and "maximizes overall performance" (Col. 5, lines 37-38)]**. Cha discloses **["Unlike the physical logging scheme, the differential logging scheme allows us to freely distribute log records to multiple disks to improve the logging performance because the commutativity and associativity of XOR used in the differential logging scheme enables processing of log records in an arbitrary order" (Par. 0051)]**.

Therefore, it would have been obvious to combine VanHuben et al. (US 6,038,651) and Cha et al. (US 2002/0116404) with Ofek (US 5,901,327) to obtain the invention as specified in claims 1 and 10.

5. As per <u>**claims 6 and 15**</u>, the combination of Ofek, VanHuben and Cha teaches "A method, according to claims 1 and 10," **[See rejection to claims 1 and 10 above]** "wherein the data from the local storage area is merged on top of data from the remote storage area" **[Ofek teaches this concept as having an "overwrite cache option" wherein "every single update to a record of a primary volume is not necessarily transmitted to the secondary volume, then a new version will overwrite this pending record in cache" (Column 39, lines 45-52) and also teaches that "Should one volume in the remote mirrored pair fail, the data storage system automatically uses the other volume without interruption" as "to perform maintenance activity on a remotely mirrored volume, the primary volume tracks all updates to its secondary**

volume and copies the updated tracks to the other volume" (Column 24, lines 48-67)].

6. **Claims 2, 7-9, 11 and 16-18** are rejected under 35 U.S.C. 103(a) as being unpatentable over Ofek (US 5,901,327), VanHuben (US 6,038,651) and Cha et al. (US 2002/0116404) as applied to claims 1, 6, 10 and 15, and further in view of Pong et al. (US 6,880,045).

7. As per **claims 2 and 11**, the combination of Ofek, VanHuben and Cha discloses "A method, according to claims 1 and 10," **[See rejection to claims 1 and 10 above]** and also teaches [**maintaining log files which "may contain different version of data written to the same location or track in the dataset" (Column 29, lines 53-54) wherein "the log file is used to recover the data file by applying to the data file the changes recorded in the log file" (Column 30, lines 41-44) as "the primary data storage system performs automatic recovery by copying the secondary volume to the primary volume" (Column 30, lines 48-50)]** as having a temporary storage to keep data updates but fails to disclose expressly "prior to reading data from the remote storage device to the local storage device, creating a temporary storage area at the local storage device if there is data from the local storage device that is to be read."

Pong teaches the concept of "prior to reading data from the remote storage device to the local storage device, creating a temporary storage area at the local storage device if there is data from the local storage device that is to be read" as **[having a multi-processor computer system in which "when a node requires a copy of the memory block, it requests the memory block from its local, private cache. If the data is found, the memory access is resolved locally. Otherwise, a remote memory access is**

performed to the home node" (Column 1, lines 44-48); and further explains having a "requesting node 200" and a "home node 300" wherein "the requesting and home nodes have the same specified values in memory locations A, B, C. After an update it is possible that the local cache of the requesting node, may have the most recent values of location A, B and C" then "the home node has stale data copies in the home memory" so "the new values for locations A, B and C" are written to "a temporary buffer in the home node" wherein "the home node SCU (system control unit)" copies "the new values from the temporary buffer to the actual memory location for A, B and C in the memory" (Column 4, lines 1-25)].

Ofek (US 5,901,327), VanHuben (US 6,038,651), Cha et al. (US 2002/0116404) and Pong et al. (US 6,880,045) are analogous art because they are from the same field of endeavor of computer memory backup/accessing/control while maintaining data coherency.

At the time of the invention it would have been obvious to a person of ordinary skill in the art to combine the data backup/retrieval as taught by the combination of Ofek and VanHuben and further use a temporary memory area in addition to a cache to store data temporarily before merging/transferring this data to a main memory as taught by Pong.

The motivation for doing so would have been because Pong discloses that using a temporary memory buffer in addition to a cache to store data temporarily before merging/transferring this data to a main memory [**prevents data loss and maintains coherent data in a memory system (Column 3, lines 3-6) as "The old values of the affected memory locations of the home memory 312 are then copied into the**

temporary buffer 315 as indicated by arrow 256 to prevent their loss in case of a failure before the transaction is completed" (Figures 2, 3 and Column 4, lines 52-58); maintaining data coherency].

Therefore it would have been obvious to combine Pong et al. (US 6,880,045) with Ofek (US 5,901,327), VanHuben (US 6,038,651) and Cha et al. (US 2002/0116404) to obtain the invention as specified in claims 2 and 11.

8. As per <u>claims 7 and 16</u>, the combination of Ofek, VanHuben and Cha discloses "A method, according to claims 1 and 10," **[See rejection to claims 1 and 10 above]** and also teaches having a remote storage comprising a secondary data storage controller in which **["The secondary data storage system controller 44 also includes cache memory 64 which receives data from channel adapter 54 and disk adapter 42, as well as disk adapter 66 which controls writing data to and from secondary storage device 48" (Column 6, lines 44-48)]** but fails to disclose expressly; "the remote storage device allocating a temporary storage area in response to data to be read being stored in a cache slot of the remote storage device."

Pong discloses the concept of "allocating a temporary storage area in response to data to be read being stored in a cache slot of the remote storage device" as **[having a multi-processor computer system in which "when a node requires a copy of the memory block, it requests the memory block from its local, private cache. If the data is found, the memory access is resolved locally. Otherwise, a remote memory access is performed to the home node" (Column 1, lines 44-48); and explains having a "requesting node 200" and a "home node 300" wherein "the requesting and home nodes have the same specified values in memory locations A, B, C. After an update it**

is possible that the local cache of the requesting node, may have the most recent values of location A, B and C" then "the home node has stale data copies in the home memory" so "the new values for locations A, B and C" are written to "a temporary buffer in the home node" wherein "the home node SCU (system control unit)" copies "the new values from the temporary buffer to the actual memory location for A, B and C in the memory" (Column 4, lines 1-25)].

Ofek (US 5,901,327), VanHuben (US 6,038,651), Cha et al. (US 2002/0116404) and Pong et al. (US 6,880,045) are analogous art because they are from the same field of endeavor of computer memory backup/accessing/control while maintaining data coherency.

At the time of the invention it would have been obvious to a person of ordinary skill in the art to combine the data backup/retrieval as taught by Ofek and further use a temporary memory area in addition to a cache to store data temporarily before merging/transferring this data to a main memory as taught by Pong.

The motivation for doing so would have been because Pong discloses that using a temporary memory buffer in addition to a cache to store data temporarily before merging/transferring this data to a main memory **prevents data loss and maintains coherent data in a memory system (Column 3, lines 3-6) as "The old values of the affected memory locations of the home memory 312 are then copied into the temporary buffer 315 as indicated by arrow 256 to prevent their loss in case of a failure before the transaction is completed" (Figures 2, 3 and Column 4, lines 52-58); maintaining data coherency].**

Therefore it would have been obvious to combine Pong et al. (US 6,880,045) with Ofek (US 5,901,327), VanHuben (US 6,038,651) and Cha et al. (US 2002/0116404) to obtain the invention as specified in claims 7 and 16.

9. As per claims 8 and 17, the combination of Ofek, VanHuben, Cha and Pong discloses "A method, according to claims 7 and 16," **[See rejection to claims 7 and 16 above]** "further comprising: reading data from the disk of the remote storage area into the temporary storage area;" **[With respect to this limitation, Pong discloses that when a backup operation is required "The old values of the affected memory locations of the home memory 312 are then copied into the temporary buffer 315 as indicated by arrow 256 to prevent their loss in case of a failure before the transaction is completed" (Column 4, lines 52-68)]** "and merging the data to be read stored in the cache slot with data from a disk in the temporary storage area" **[With respect to this limitation, Pong discloses "After the new values are written into the home node memory 312, the home node 300, acknowledges with an "ack" signal as indicated by arrow 274 that all the new values have been successfully captured. Upon receiving the acknowledgement, the receiving node will issue a "request-to-commit" request as indicated by arrow 276. Finally, the home node SCU 310 acknowledges with a "commit" message along arrow 278 to indicate that the transaction has been completed" (Column 5, lines 3-11); as indicating that data has been merged]**.

10. As per claims 9 and 18, the combination of Ofek, VanHuben, Cha and Pong discloses "A method, according to claims 7 and 16 above," **[See rejection to claims 7 and 16 above]** "further comprising: prior to the remote storage area determining if there is data to be read stored in a cache slot of the remote storage device, the remote storage

device writing at least a portion of the data from at least one cache slot of the remote storage device to a disk of the remote storage device" [**Ofek teaches this concept "The secondary data storage system controller 44 also includes cache memory 64 which receives data from channel adapter 54 and disk adapter 42, as well as a disk adapter 66 which controls writing data to and from secondary storage device 48" (Column 6, lines 44-48) as having a cache for temporary data storage before writing data to disk. Pong further discloses this concept as "The SCU (system control unit) 210 further contains a cache flushing engine (CFE) 220, shown in FIG. 2" (See figure 2 and Column 3, lines 53-54) as having means for flushing data from cache to a remote or "home memory"**].

11. **Claims 3-5 and 12-14** are rejected under 35 U.S.C. 103(a) as being unpatentable over Ofek (US 5,901,327), VanHuben (US 6,038,651), Cha et al. (US 2002/0116404) and Pong et al. (US 6,880,045) as applied to claims 2, 7-9, 11 and 16-18 above, and further in view of Bodnar (US 6,012,063).

12. As per **claims 3 and 12**, the combination of Ofek, VanHuben, Cha and Pong discloses "A method, according to claims 2 and 11," [**See rejection to claims 2 and 11 above**] but fails to disclose expressly that "the temporary storage area is a scratch slot."

Bodnar teaches having a "temporary storage area" which "is a scratch slot" as [**"The volatile memory is a *scratch* memory, for storing temporary computation results" (Column 2, lines 13-14) and explains that this scratch memory is used "for providing work space for the operating system and applications" (Column 2, lines 15-16)**].

Ofek (US 5,901,327), VanHuben (US 6,038,651), Cha et al. (US 2002/0116404), Pong et al. (US 6,880,045) and Bodnar (US 6,012,063) are analogous art because they are from the same field of endeavor of computer memory backup/accessing/control/data transfers while maintaining data coherency.

At the time of the invention it would have been obvious to a person of ordinary skill in the art to combine the data backup/retrieval as taught by Ofek and VanHuben, use a temporary memory area in addition to a cache to store data temporarily before merging/transferring this data to a main memory as taught by Pong and further make this temporary memory area be "a scratch" slot as taught by Bodnar.

The motivation for doing so would have been because Bodnar teaches that temporarily saving data to a memory scratch area **[minimizes the number of data transfers in a computer system; therefore, speeding overall system execution time (Column 1, lines 56-63) as a temporary scratch area is used "for providing work space for the operating system and applications" (Column 2, lines 15-16)]**.

Therefore it would have been obvious to combine Bodnar (US 6,012,063) with Ofek (US 5,901,327), VanHuben (US 6,038,651), Cha et al. (US 2002/0116404) and Pong et al. (US 6,880,045) to obtain the invention as specified in claims 3 and 12.

13. As per <u>**claims 4 and 13**</u>, the combination of Ofek, VanHuben, Cha Pong and Bodnar discloses "A method, according to claims 3 and 12," **[See rejection to claims 3 and 12 above]** "further comprising: prior to creating a temporary storage area, locking slots of the local storage device that correspond to data from the local storage device that is to be <u>used</u>" **[With respect to this limitation, Pong discloses that "a transaction performed on global data structures consists of a request phase, an execution phase**

and finally a commit phase" wherein "the LOCK operation defines where the original system state is and where the request phase begins" (Column 2, lines 41-43 and 48-50) as locking memory slots every time data is updated or moved].

14. As per <u>**claims 5 and 14**</u>, the combination of Ofek, VanHuben, Cha, Pong and Bodnar discloses "A method, according to claims 4 and 13," **[See rejection to claims 4 and 13 above]** "further comprising: after merging the data, unlocking the slots of the local storage device that correspond to of data from the local storage device that is to be read" **[With respect to this limitation, Pong discloses that "a transaction performed on global data structures consists of a request phase, an execution phase and finally a commit phase" wherein "the UNLOCK operation indicates where the update operations must commit. Specifically, before the LOCK is released, the home memory of A, B and C is either completely updated with the new values, or is unchanged" (Column 2, lines 41-43 and 50-54) as releasing a lock when data merged/overwritten]**.

<u>ACKNOWLEDGMENT OF ISSUES RAISED BY THE APPLICANT</u>

<u>*Response to Amendment*</u>

15. Applicant's arguments filed on May 7, 2007 have been fully considered but they are moot in view of new grounds of rejection.

<u>ARGUMENTS CONCERNING PRIOR ART REJECTIONS</u>

16. It is the Examiner's position that the prior art of record discloses all the limitations required by the claims.

FIRST POINT OF ARGUMENT

17. Regarding Applicant's remark that Ofek does not disclose **wherein the cache of the local storage device contains data written to the local storage device begun after a first time and before a second time that is associated with a first chunk of data and contains data written to the local storage device begun after the second time that is associated with a second chunk of data different from the first chunk of data and wherein after completion of all writes associated with the first chunk of data, the local storage device initiates transfer of writes associate with the first chunk of data to the remote storage device,** the Examiner disagrees as [Ofek discloses **"the host processor sends chains of channel commands to the data storage system containing a primary (R1) volume of a remotely mirrored volume pair. The results of all channel commands of each chain, for example, are to be committed before commitment of the results of any following channel commands. The data storage system containing the primary (R1) volume bundles the write data for all write commands in the chain into a single write command for transmission over the data link to the secondary data storage system containing the secondary (R2) volume... once the last channel command in the chain is received, it transmits the bundle of write data for the chain over the link to the data storage system containing the secondary volume" (Page 2, lines 37-53) wherein these channels commands are satisfied from cache in the local device (Column 14, lines 28-34)]** wherein **"when the data storage system containing the primary (R1) volume has valid data in cache destined for a secondary (R2) volume, a link adapter transfers data via an available link path to the cache in the data storage system containing the secondary (R2) volume. This data transfer**

occurs while the data storage system containing the primary (R1) volume continues to perform additional channel commands" (Page 13, lines 36-42). Ofek further explains "the link adapter removes the entry from the head of the link queue, marks the status information of the header with a time stamp or sequence number, and executes the job to send the command... the time stamp or sequence number can be used by the remote data storage system to detect link transmission problems and to write to its cache in proper sequence data from commands received from various links and link adapters despite the possible delay of some commands due to link failure" (Page 38, lines 34-57); therefore, the data transmitted from a host to a primary system might not necessary be transmitted to a secondary/remote system in the same order it was written to the host system, as some of the data written to the host system might not be written in proper sequence to the secondary/remote system due to delays of some commands due to link failure].

18. All arguments by the applicant are believed to be covered in the body of the office action or in the above remarks and thus, this action constitutes a complete response to the issues raised in the remarks dated May 7, 2007.

CLOSING COMMENTS

Conclusion

Applicant's amendment necessitated the new ground(s) of rejection presented in this Office action. Accordingly, **THIS ACTION IS MADE FINAL**. See MPEP

§ 706.07(a). Applicant is reminded of the extension of time policy as set forth in 37 CFR 1.136(a).

A shortened statutory period for reply to this final action is set to expire THREE MONTHS from the mailing date of this action. In the event a first reply is filed within TWO MONTHS of the mailing date of this final action and the advisory action is not mailed until after the end of the THREE-MONTH shortened statutory period, then the shortened statutory period will expire on the date the advisory action is mailed, and any extension fee pursuant to 37 CFR 1.136(a) will be calculated from the mailing date of the advisory action. In no event, however, will the statutory period for reply expire later than SIX MONTHS from the date of this final action.

STATUS OF CLAIMS IN THE APPLICATION

19. The following is a summary of the treatment and status of all claims in the application as recommended by **M.P.E.P. § 707.07(i)**:

a(1) CLAIMS REJECTED IN THE APPLICATION

20. Per the instant office action, claims **1-18** have received a second action on the merits and are subject of a final rejection.

21. For at least the above reasons it is the examiner's position that the applicant's claims are not in condition for allowance.

DIRECTION OF FUTURE CORRESPONDENCES

22. Any inquiry concerning this communication or earlier communications from the examiner should be directed to Yaima Campos whose telephone number is (571) 272-1232 and email address is Yaima.Campos@uspto.gov. The examiner can normally be reached on Monday to Friday 8:30 AM to 5:00 PM.

IMPORTANT NOTE

23. If attempts to reach the above noted Examiner by telephone or email are unsuccessful, the Examiner's supervisor, Mr. Sanjiv Shah can be reached on (571) 272-4098.

24. The fax phone number for the organization where this application or proceeding is assigned is 571-273-8300. Information regarding the status of an application may be obtained from the Patent Application Information Retrieval (PAIR) system. Status information for published applications may be obtained from either Private PAIR or Public PAIR. Status information for unpublished applications is available through Private PAIR only. For more information about the PAIR system, see http://pair-direct.uspto.gov. Should you have questions on access to the Private PAIR system, contact the Electronic Business Center (EBC) at 866-217-9197 (toll-free).

June 27, 2007

Yaima Campos
Examiner
Art Unit 2185

SANJIV SHAH
SUPERVISORY PATENT EXAMINER
TECHNOLOGY CENTER 2100